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1978 marine boundary layer study (MABLES-WC)

Schacher, G. E. (Gordon Everett)

Monterey, California. Naval Postgraduate School

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Monterey, California

1978 MARINE BOUNDARY LAYER
STUDY (MABLES-WC)

by

G.E. Schacher, E. Garner,
T. Usher, and C.W. Fairall

NPS Initial Data Report

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Rear Admiral T.F. Dedman
Superintendent

Jack R. Borsting
Provost

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This report was prepared by:

G.E. Schacher
Associate Professor of Physics

C.W. Fairall

K.L. Davidson
Associate Professor of Meteorology

Reviewed by:

K.E. Woehler, Chairman
Department of Physics & Chemistry

Released by:

William M. Tolles
Dean of Research

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Marine Boundary Layer

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

During August of 1978 meteorological data was collected at sea off the central coast of California. This report describes the plan of the ships operations and the type of measurements made. The data obtained has been corrected for instrument calibration and is also presented.

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1978 Marine Boundary Layer Study (MABLES-WC)

NPS Initial Data Report

I. Introduction

During August of 1978 the Naval Postgraduate Schools Environmental Physics Group participated in a major study of the marine boundary layer. The study was designated Marine Atmosphere Boundary Layer Experiments-West Coast (MABLES-WC). This effort was organized by San Jose State University and involved two ships, three aircraft, nine mainland ground stations, and one ground station on the Farallon Islands. NPS manned a ground station in Monterey and used the R/V ACANIA for overwater experiments.

Since several organizations were involved in the study it is necessary to make the data from the various sites and platforms available to all participants as quickly as possible. The purpose of this report is to transmit the R/V ACANIA data to all participants and to others in the meteorological community who are involved in studies of the marine boundary layer. Only the basic data is included here. The data has been checked for internal consistency and for correct operation of the various pieces of experimental equipment. No interpretations or calculations are presented; they will be the subject of later reports and publications.

The R/V ACANIA has been completely instrumented for atmospheric research by the Enivronmental Physics Group and a complete description of the equipment can be found in NPS report number NPS61-78-001. In brief, the following measurements were made:

1. Sea surface temperature

2. Air temperature at heights of 4, 7, and 21.5 meters above the mean water level.
3. Wind speed at the same heights
4. Dew point temperature at 7 and 21.5 meters
5. Relative wind direction at 21.5 meters
6. Visibility
7. Temperature inversion height
8. Fluctuation of air temperature
9. Fluctuation of horizontal wind speed
10. Hourly weather observations
11. Twice daily radiosonde releases

All of the data were acquired and averaged for either 20 or 30 minute periods. We do not report the fluctuation measurements or the hourly weather observations here. The observations for all platforms are being correlated and put in a common report by SJS.

II. Ship Data

In this section we present information on the ships location, speed and course. This information is in three forms: A) a general description, B) charts, and C) table of significant changes in course and/or speed with descriptive comments. All times are PDT, all speeds are in knots, and all directions are relative to true north.

A. General Description

The at sea experiments were divided into two phases: The first four days were spent in an air quality study of the near coast region in the immediate San Francisco area. The remainder of the time was spent on the marine boundary layer study.

The area involved in the air quality study was defined by the shoreline and the seaward boundaries of the Bay Area Pollution Control District model. The western boundary was 123° 05'W; the southern boundary was 37° 20'N; the northern and eastern boundaries were defined by the shoreline. Within this area we sailed three north-south tracks along 122° 35'W, 122° 50'W and 123° 05'W. A rough diagram of the tracks and the schedule for taking data at the odd numbered locations follows:

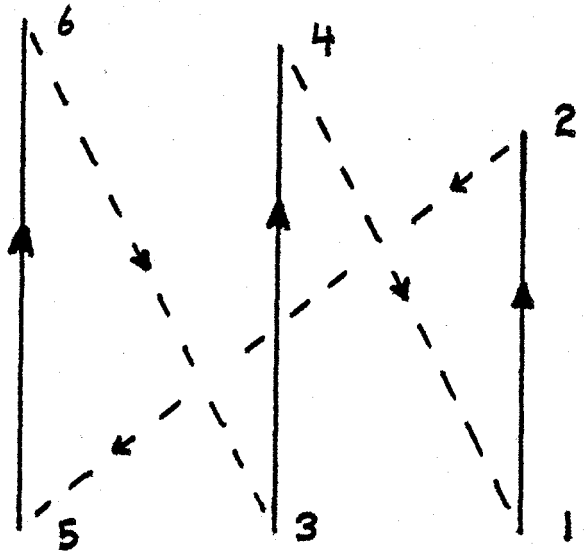

Figure 1. Rough diagram of chart for air pollution model study.

Table 1. Dates and times for operation at odd numbered stations

Station	Date/Time		
1	31/1500	2/0300	3/1500
3	1/0300	2/1500	4/0300
5	1/1500	3/0300	

As can be seen, the schedule was arranged so that each station was used at least twice, alternately during night and afternoon.

The ship always sailed north leaving the odd stations (solid lines) and followed the dashed lines from even to odd stations. We arrived at an odd station at least one hour before the scheduled time in order to sail slow ahead (1 to 2 knots) into the wind for two hours to obtain good data. The same procedure was followed at the even stations except only one half hour of measurements was required. Normally conditions were such that the ship could proceed at full ahead between stations, spending longer than one hour at each station. During the last 18 hours of this study the ship proceeded north from station 1, maintained a distance of approximately 1 kn mi from shore, sailed into and out of San Francisco Bay and spent the night taking air quality data outside the Golden Gate at 122° 50'W, 37° 58'N.

During the boundary layer study the ship took data at prescribed times at three stations. The stations were located along 37° 10'N at: A-122° 40'W, B-123° 15'W, and C-123° 50'W. The schedule for this study is given below.

Table 2. Ship schedule for boundary layer study.

Date/Time	0400	1000	1600	2200
8/4			B	C
5	C	B	A	A
6	B	C	C	B
7	A	A	B	C
8	C	B	A	A
9	B	C	B	B
10	A	B	C	C
11	B	A	B	C
12	C	B	A	A
13	B	C	C	B
14	A	A	B	C
15	C	B	A	A
16	B	C	C	B
17	A	A		

Weather permitting, the ship sailed at full ahead between stations. We arrived at each station at least one hour before and left approximately one hour after the appointed time. The ship was positioned downwind of the station at a distance such that we would cross the station at the appointed time by sailing slow ahead into the wind.

B. Charts

No chart is presented for the boundary layer study since we stayed near the 37° 20'N line for the full time. We should note, however, that

we did move as far as six miles off this line due to taking data while proceeding into the wind.

The chart for the air pollution study is shown in Figure 2. The prescribed track was covered two full times, indicated by the solid and dashed lines. The pattern began at approximately 1600 on 7/3, solid line, from station 1. Times at one half hour intervals are shown. The times for the dashed line track are underlined, while the times for the solid line track are not. At 2155 on 8/3 we began drifting offshore, north of the Golden Gate. We remained there overnight, then left at ~0830 on 8/4 to proceed at full ahead for station B for the boundary layer study.

C. Significant Changes in Course and/or Speed

Minor course changes, such as those needed to correct for course deviation due to currents, avouding traffic, etc., are not indicated. Table 3 lists date, time, latitude and longitude, heading with respect to true north, ship speed, and comments. The ship speed is listed either as full or slow for a speed of 8-9 knots or 0.5-2 knots, respectively. The actual speed depends on the wind speed.

Table 3. Significant changes in course and/or speed

Date	Time	Latitude	Longitude	Heading	Speed	Comments
7/31	1546	37° 20.1'	122° 35.1'	000°T	Full	At position A, going to position B
	1915	37° 48.5'	122° 35.2'	270°T	Full	At position B, sailing west
	1933	37° 48.5'	122° 37.3'	218°T	Full	Heading to position C
8/ 1	0000	37° 20.4'	123° 05.3'	305°T	Slow	A position C, heading into wind
	0255	37° 22.0'	123° 07.5'	005°T	Full	Heading toward position D
	0738	38° 00.0'	123° 05.6'		Slow	At D, heading into wind
	0820	38° 00.3'	123° 04.0'	164°T	Full	Leave for position E
	1317	37° 19.8'	122° 50.3'	215°T	Slow	At position E, Slow into wind
	1500	37° 16.8'	122° 52.9'	015°T	Full	Head for position F
	1705	37° 22.2'	122° 50.0'	350°T	Full	Alter course
	1957	37° 57.5'	122° 50.2'	160°T	Slow	At position F, heading slow into wind
	2043			153°T	Full	Leave for position A
8/ 2	0118	37° 19.8'	122° 35.2'	191°T	Slow	At position A, slow into wind
	0312	37° 15.1'	122° 36.4'	005°T	Full	Leave for position B
	0406	37° 20.6'	122° 34.9'	350°T	Full	Adjust course
	0732	37° 48.9'	122° 34.9'		Slow	At position B
	0800	37° 48.5'	122° 35.9'	260°T	Full	Leave for position C
	0808	37° 48.5'	122° 37.0'	208°T	Full	Alter course
	1233	37° 20.0'	123° 05.3'		Slow	At station C, slow into wind
	1617	37° 21.4'	123° 12.7'	009°T	Full	Leave for position D
	2108	38° 00.0'	123° 05.5'		Slow	At position D, slow into wind
	2135	38° 01.5'	123° 06.8'	140°T	Slow	Slow into wind
	2200	37° 54.0'	123° 05.7'	153°T	Slow	Slow into wind
8/ 3	0000	37° 42.5'	122° 58.5'	285°T	Slow	Slow into wind
	0030			160°T	Full	Leave for position E
	0325	37° 19.9'	122° 49.9'	270°T	Slow	At position E, slow into wind
	0405	37° 20.0'	122° 51.1'	002°T	Full	Leave for position F
	0842	37° 57.5'	122° 50.2'	112°T	Slow	At position F, slow into wind
	0916			153°T	Full	Leave for position A
	1356	37° 19.7'	122° 34.9'	260°T	Slow	At position A, slow into wind
	1527	37° 19.6'	122° 37.7'	090°T	Full	Heading for shore
	1552	37° 19.4'	122° 33.6'	000°T	Full	Moving ll to shore
	1730	37° 32.1'	122° 33.9'	008°T	Full	Alter course
	1900					Entered San Francisco Bay
	2100					Left San Francisco Bay
	2155	37° 51.1'	122° 40.0'			At position B, stopped

Date	Time	Latitude	Longitude	Heading	Speed	Comments
8/ 4	0828	37° 52.5'	122° 39.8'	212°T	Full	Leaving for lower track, pass through position C
	1255	37° 19.7'	123° 05.1'	335°T	Slow	At position C, slow into wind
	1336	37° 20.5'	123° 05.3'	217°T	Full	Leave position C
	1510	37° 09.9'	123° 15.2'			Arrive lower track-position 2
	1522			320°T	Slow	Head into wind
	1707	37° 12.4'	123° 17.3'	138°T	Slow	Alter course
	1900	37° 10.1'	123° 16.0'	000°T	Slow	Alter course
	2047	37° 15.6'	123° 17.8'	345°T	Full	Going to rendevouz with CAYUSE
	2145				Slow	Met CAYUSE
	2230	37° 21.7'	123° 19.5'	163°T	Full	Done, continue to next position
	2315	37° 21.0'	123° 20.8'	145°T	Full	Alter course
8/ 5	0155	37° 03.5'	123° 05.5'	335°T	Slow	Heading slow into wind at position 2
	0800	37° 12.8'	123° 14.3'	170°T	Half	Turned to go back below position 2
	0900	37° 05.9'	123° 12.8'	350°T	Slow	Reversed course, slow into wind
	1050	37° 10.0'	123° 15.0'	010°T	Slow	Passed through position 2
	1130	37° 10.8'	123° 14.9'	098°T	Full	Leaving for position 1
	1535	37° 06.5'	122° 36.0'	285°T	Slow	Arrived below position 1
	1701			085°T	Full	Adjust for wind direction
	1747	37° 08.1'	122° 30.7'	290°T	Slow	Heading back into wind
8/ 6	0000	37° 13.3'	122° 43.6'	259°T	Full	Leave for position 2
	0030			259°T	2/3	Slowed a little
	0400	37° 08.8'	123° 14.5'	310°T	Slow	Heading up to position 2
	0607	37° 11.1'	123° 17.0'	260°T	Full	Leave for position 3
	0900	37° 08.1'	123° 37.4'	336°T	Slow	Arrived below position 3, slow into wind
	1206			115°T	Half	Turned around
	1222				Full	Alter speed
	1305	37° 09.8'	123° 43.2'	130°T	2/3	
	1317	37° 08.6'	123° 41.5'	290°T	Slow	Arrived below position 3, slow into wind
	1830	37° 11.3'	123° 49.3'	101°T	Full	Leaving for station #2
	2200	37° 08.3'	123° 13.0'	320°T	Slow	Arrived below position 2, slow into wind
8/ 7	0003	37° 12.3'	123° 17.3'	098°T	Full	Move to position 1
	0406	37° 08.7'	122° 38.8'	310°T	Full	Move to other side of 1
	0430	37° 10.6'	122° 41.3'	Southerly	Slow	Slow into wind
	0900	36° 59.2'	122° 35.8'	Drifting		
	0920	36° 59.0'	122° 35.5'		Full	Head back to 1
	1042			320°T	Slow	Head back into wind
	1206	37° 11.6'	122° 41.9'	266°T	Half	Leaving for position 2
	1217			266°T	2/3	Alter speed

Date	Time	Latitude	Longitude	Heading	Speed	Comments
8/ 7 (cont)	1530	37° 08.5'	123° 14.1'	325°T	Slow	Arrived below position 2, slow into wind
	1805	37° 12.9'	123° 15.9'	250°T	Half	Leaving for position 3
	2130	37° 07.6'	123° 42.8'		Slow	Arrived below position 3, slow into wind
8/ 8	0000	37° 10.6'	123° 51.6'	150°T	Slow	
	0020				2/3	Back to below 3
	0125	37° 04.8'	123° 44.3'	315°T	Slow	Below position 3, slow into wind
	0605	37° 09.5'	123° 50.1'	095°T	Full	Leaving for station 2
	0940	37° 07.6'	123° 12.3'	335°T	Slow	Arrived below position 2, slow into wind
	1200	37° 12.5'	123° 15.6'	325°T	Slow	
	1234	37° 13.8'	123° 16.6'	098°T	Full	Leaving for position 1
	1615	37° 08.9'	122° 39.0'	320°T	Slow	Arrived below position 1, slow into wind
	2000	37° 10.4'	122° 44.8'	115°T	Full→	Headed below 1, stbd. engine only
	2040	37° 07.5'	122° 38.6'	320°T	Slow	Slow into wind
8/ 9	0000	37° 10.4'	122° 44.0'	262°T		Alter course
	0336	37° 08.5'	123° 13.3'	325°T	Slow	Slow into wind
	0605	37° 11.6'	123° 14.8'	260°T	Half	Leave for position 3
	0930	37° 08.0'	123° 46.6'	320°T	Slow	Arrived below position 3, slow into wind
	1230	37° 12.7'	123° 50.8'	095°T	Full	Leaving for position 2
	1600	37° 08.9'	123° 13.8'	345°T	Slow	Arrived below position 3, slow into wind
	1905	37° 16.3'	123° 14.5'	165°T	Full	Heading back below position 3
	2030			340°T	Slow	Arrived below position 2, slow into wind
8/10	0004	37° 14.0'	123° 17.3'	096°T	Full	Heading to position 1
	0405	37° 08.3'	122° 38.5'	350°T	Slow	Arrived below position 1, slow into wind
	0610	37° 12.4'	122° 39.3'	260°T	Full	Leaving for position 3
	0910	37° 06.8'	123° 12.3'	335°T	Slow	Arrived below position 3, slow into wind
	1200			325°T	Slow	
	1230	37° 13.6'	123° 15.9'	259°T	Half	Leaving for position 2
	1537	37° 07.7'	123° 47.0'	315°T	Slow	Arrived below position 3, slow into wind
	1845	37° 12.8'	123° 50.4'	165°T	Full	Turned around
	1945	37° 04.5'	123° 46.7'	325°T	Slow	Turned back into wind
8/11	0000	37° 09.7'	123° 48.4'	093°T	Full	Turned around
	0325	37° 07.5'	123° 13.2'	335°T	Slow	Turn back into wind
	0605	37° 12.6'	123° 17.2'	305°T	Full	Looking for CAYUSE
	0945					Met CAYUSE
	1000	37° 28.2'	123° 42.7'	198°T	Half	Completed rendevouz

Date	Time	Latitude	Longitude	Heading	Speed	Comments
8/11 (cont)	1340	37° 05.3'	123° 46.6'	315°T	Slow	Arrived below position 3, slow into wind
	2005	37° 10.3'	123° 48.8'	165°T	1/2	Turned around, stbe engine only
	2045	37° 06.4'	123° 47.1'	320°T	Slow	Heading into wind toward position 3
8/12	0006	37° 10.4'	123° 51.8'	140°T	Half	Turned around to head below 3
	0118	37° 05.8'	123° 45.9'	330°T	Slow	Slow into wind
	0603	37° 11.4'	123° 50.0'	100°T	Full	Leaving for position 2
	1012	39° 09.1'	123° 11.7'	300°T	Slow	Arrived below position 2, slow into wind
	1246	37° 12.7'	123° 20.1'	096°T	Full	Leaving for position 1
	1805	37° 09.0'	122° 38.6'	295°T	Slow	Arrived below position 1, slow into wind
	2115	37° 11.8'	122° 43.8'	135°T		Turned around
	2200	37° 08.9'	122° 39.6'	325°T	Slow	Turn back into wind
8/13	0006	37° 10.6'	122° 40.9'	266°T	Full	Leaving for position 2
	0327	37° 09.4'	123° 12.4'	310°T	Slow	Arrived below position 2, slow into wind
	0605	37° 12.5'	123° 17.1'	260°T	Half	Leaving for position 3
	0920			315°T	Slow	Arrived below position 3, slow to windward
	1215	37° 10.0'	123° 50.8'	135°T	Half	Turned around
	1310	37° 06.5'	123° 45.9'	315°T	Slow	Slow into wind at position 3
	1335					Launched and lost kytoon
	1416					Found remains of kytoon
	1416	37° 03.3'	123° 44.1'	315°T	Slow	Turned back into wind
	1845			090°T		Leaving for position 2
	2215	37° 07.6'	123° 16.2'	320°T	Slow	Arrived below position 2, slow into wind
8/14	0005	37° 09.7'	123° 15.6'	093°T	Full	Leaving for position 1
	0338	37° 07.9'	122° 39.1'	320°T	Slow	Arrived below position 1, slow into wind
	0500			320°-040°		Steering various course into wind
	0603	37° 11.8'	122° 38.3'	180°T	Slow	Slow into wind
	0700			Drifting		
	0800	37° 06.8'	122° 38.9'	300°T	Half	Moving to west of position 1
	0855			145°T	Slow	Turned into wind
	1200	37° 03.9'	122° 35.7'	185°T	Slow	Slow into wind
	1230	37° 02.5'	122° 35.1'	283°T		Turned around→moving to 2
	1648	37° 09.7'	123° 14.7'	335°T	Slow	Slow into wind, Arrived at 2
	1830			258°T	Half	Leaving for station 3
	2145	37° 08. '	123° 47. '	340°T	Slow	Arrived below position 3, slow into wind

Date	Time	Latitude	Longitude	Heading	Speed	Comments
8/15	0005	37° 12.0'	123° 49.6'	160°T		Turned around
	0106	37° 04.9'	123° 47.1'	305°T	Slow	Slow into wind
	0605	37° 07.3'	123° 58.4'	087°T	Full	Leaving for position 2
	1000	37° 12.0'	123° 12.7'	210°T	Slow	Arrived below position 2, slow into wind
	1232	37° 07.7'	123° 14.5'	081°T	Full	Leaving for position 1
	1537	37° 11.4'	122° 40.2'	170°T	Slow	Arrived below position 1, slow into wind
	1600	37° 10.4'	122° 39.7'	200°T	Slow	
	1915	37° 03.3'	122° 40.6'	020°T	Full	Turning to go below position 1
	2100	37° 13.0'	122° 37.7'	200°T	Slow	Slow into wind
8/16	0004	37° 05.9'	122° 41.7'	275°T	Full	Leaving for position 2
	0320	37° 08.5'	123° 13.6'	325°T	Slow	Arrived below position 2, slow into wind
	0400			315°T	Slow	Alter course
	0645	37° 11.5'	123° 11.5'	260°T	Full	Leaving for 3
	1030	37° 07.6'	123° 47.9'	315°T	Slow	Arrived below position 3, slow into wind
	1237	37° 09.5'	123° 51.6'	135°T		Turned around
	1330	37° 06.0'	123° 44.7	320°T	Slow	Turned back into wind
	1830			093°T	Full	Leaving for position 2
	2145	37° 09	123° 14	320°T	Slow	Arrived below position 2, slow into wind
	2315	37° 11	123° 16	095°T	Half	Leaving for position 1
8/17	0350	37° 08.2'	122° 39.4'	315°T	Slow	Arrived below 1, slow into wind
	0425					Met CAYUSE and went home

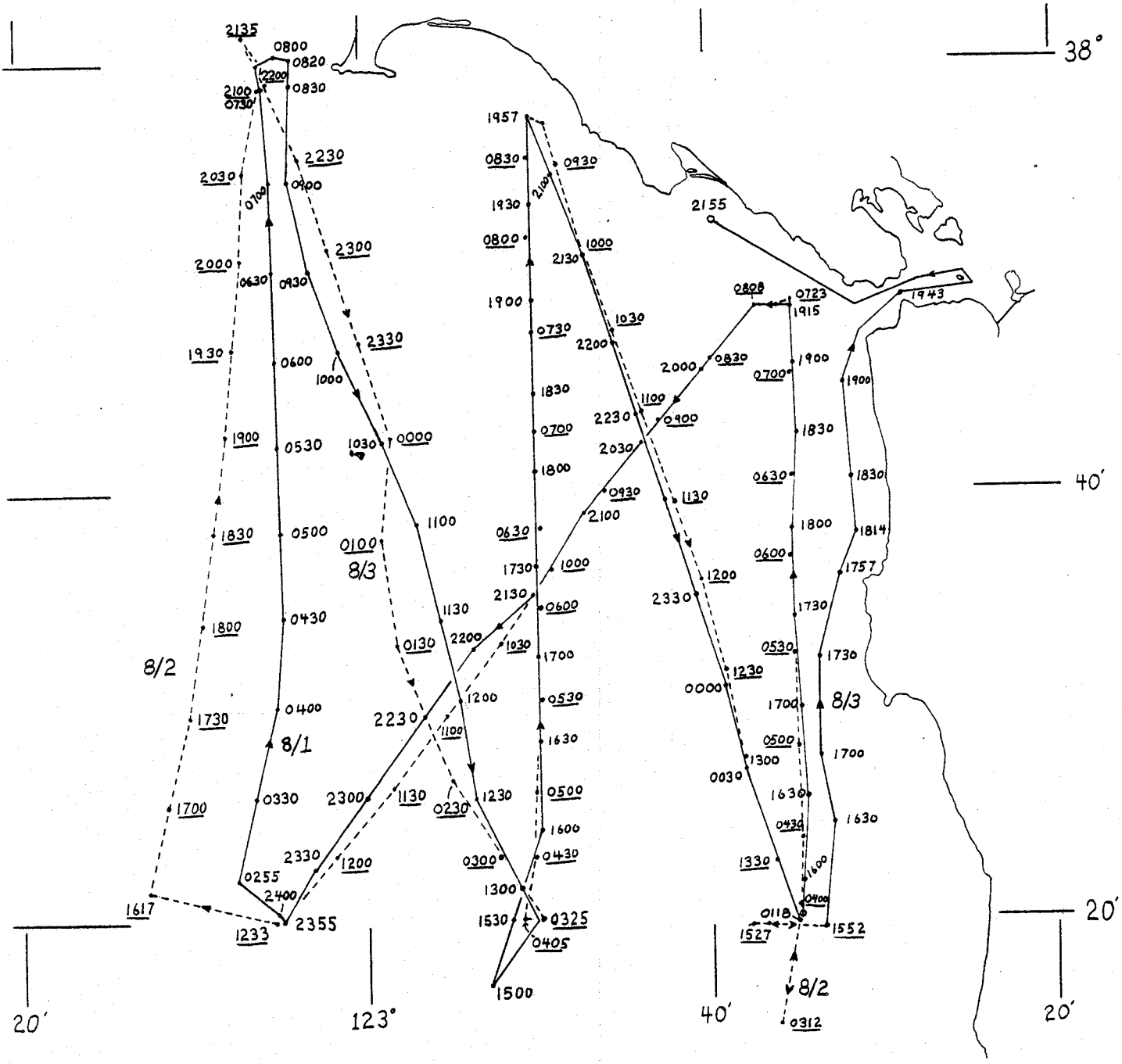

Fig. 2. Chart for air pollution study, 7/31 - 8/3.

III. Visibility

During the cruise visibility was monitored continuously with an MRI model 142A visiometer. Many times the visibility was reduced and at times we had fairly heavy fog. The following table lists all times when the visibility fell below 8000 meters. Listed are the date, time and minimum visibility. The visibility always fluctuates, and the start and end times listed indicate the period when the obscuration is noticeable, not when it falls below 8000 meters. Visibility values are rounded off to the nearest 100 meters.

Table 4 Times of reduced visibility

Date	Start Time	End Time	Minimum Visibility (meters)
8/ 1	1500	1520	3800
	1930	2025	6600
	2030	0030	1000
8/ 2	0030	0925	2200
	0925	1945	6600
	2112	0035	1600
8/ 3	0035	0825	1800
	2345	0500	1200
8/ 4	0640	1045	1000
	2320	0120	1000
8/ 5	0545	0855	700
	0900	1028	4200
	1935	2015	500
	2100	2110	4400
8/ 7	0440	0615	400
	1930	0635	1000
8/ 8	2120	0125	4000
8/ 9	2340	0020	4400
8/10	0025	0750	1100
	1900	1932	2400
	2310	2320	4600

Date	Start Time	End Time	Minimum Visibility
8/11	0715	1000	2000
	2000	2030	2800
8/12	0100	0117	4000
	0350	0425	3200
	2115	2200	1600
	2240	2312	800
8/13	1230	1300	800
	1340	1420	1100
8/14	0200	1330	600
	1450	1600	1500
8/15	0345	0700	700
	2315	0150	2200
8/16	1240	1350	1500

IV. Meteorological Data

The data reported and their units are: Sea surface temperature and temperatuare at level 4 (21 meters) in degrees centigrade, relative wind speed at level 4 in knots, wind direction at level 4 in degrees clockwise relative to the bow of the ship, relative humidity in percent, inversion height in meters, and true wind in knots and degrees relative to true north. All times are Pacific Daylight. Almost all of the data is based on one half hour averages.

True wind direction and speed were obtained by two methods: 1) calculated from the 30 minute average relative wind speed and direction and the ships speed and heading, 2) stopping the ship and making a direct measurement. These values are no more accurate than $\pm 10°$, ± 1 knt. The direction error is greater for low wind speeds (<2 knts). Errors are due to the normal gustiness of the wind, and ship roll. The true wind values obtained when the ship was stopped are underlined in the table.

Examination of the true wind results show that the calculated values tend to be higher than those obtained by direct measurement. This is due to two effects: 1) the direct measurements are obtained with the ships anemometer which apparently was reading slightly low (a +2 knt correction has already been applied to the reading) and 2) the roll of the ship tends to produce slightly high readings as measured by the cup anemometer at level 4.

The inversion height, Z_i, is obtained from the lowest return from the acoustic sounder. Since acoustic sounder records are subject to interpretation we include photographs of the original records as figures 3a-f.

Date	Time	Relative Wind Dir	Relative Wind Speed (knts)	T_s(°C)	T_4(°C)	Humid (%)	Z_i (m)	True Wind Dir	True Wind Speed (knts)
7/31	1100	003	10.4	12.57	10.82	96	300	346	2.5
	1130	349	10.6	12.70	10.78	96	280	293	3.1
	1200	341	12.8	14.28	10.78	96	240	289	5.8
	1223	350	20.6	12.12	10.45	91	140	293	12.8
	1323	353	23.9	11.03	10.66	93	120	300	16.0
	1353	358	24.5	11.62	10.93	93	200	306	16.5
	1423	002	23.6	11.27	10.92	93	230	313	15.6
	1527	344	22.0	11.92	11.07	88	240	291	14.5
	1557	343	20.1	12.84	11.05	92	240	288	12.7
	1627	333	17.9	12.95	11.01	92	220	270	11.4
	1657	336	17.5	12.48	10.83	94	240	274	10.7
	1727	334	15.5	13.22	10.75	94	220	266	9.0
	1757	318	9.7	13.12	10.50	95	220	272	6.5
	1827	320	8.0	13.06	10.41	95	200	285	5.5
	1902	315	6.9	14.27	11.16	93	180	297	5.8
	1934	342	16.2	14.14	11.90	88	160	241	8.9
	2004	020	15.4	12.95	11.70	88	100	264	8.3
	2034	025	14.9	12.88	11.61	87	240	275	8.4
	2104	023	14.4	12.67	11.55	89	240	265	5.5
	2130	025	12.8	11.18	11.62	89	260	270	6.5
	2201	022	12.1	11.08	11.70	89	300	270	5.6
	2231	028	12.8	11.68	12.09	88	320	277	6.9
	2301	036	12.6	12.18	12.51	85	320	289	7.7
	2331	049	13.4	12.46	12.73	83	320	310	10.0
8/ 1	0050	002	11.3	12.76	12.81	83		308	9.8
	0120	354	11.9	12.89	12.79	82	340	298	11.4
	0150	355	11.8	12.98	12.69	83	340	300	11.3
	0220	002	12.6	12.96	12.59	84	340	307	12.1
	0250	356	13.2	12.86	12.51	85	360	301	12.1
	0337	324	17.2	13.03	12.38	86		306	11.5
	0407	321	17.1	12.91	12.24	87		302	11.8
	0437	321	17.5	12.83	12.01	88	360	303	12.1
	0507	323	19.1	12.14	11.68	88	350	309	13.3
	0537	325	19.1	11.55	11.20	89	340	312	13.1
	0607	328	18.2	11.58	10.87	91	200	313	11.9
	0637	354	15.8	11.40	10.02	95	220	355	7.4
	0707	028	11.4	11.20	10.07	95	240	082	5.6
	0737	033	10.2	9.96	10.20	95	280	097	5.5
	0819	009	10.6	9.96	10.49	94	300	111	10.1
	0849	330	14.3	9.99	10.24	95		102	8.1
	0919	327	11.7	11.01	10.12	96		086	6.5
	0949	338	8.1	11.69	10.04	96		056	3.2
	1023	020	8.4	11.36	10.06	91	370	271	3.1
	1053	032	13.4	11.63	10.04	95		231	7.5
	1123	019	17.3	11.61	10.24	94		197	9.3
	1153	019	15.9	11.57	10.69	94	400	200	7.9
	1246	021	14.0	12.28	11.37	92		200	7.1

Date	Time	Relative Wind Dir	Relative Wind Speed (knts)	T_s (°C)	T_4 (°C)	Humid (%)	Z_i (m)	True Wind Dir	True Wind Speed (knts)
8/ 1	1316	022	13.2	12.45	11.61	92		211	5.9
(cont)	1352	336	8.2	12.55	11.50	91	470	218	7.3
	1422	350	8.2	12.63	11.55	93	480	203	7.2
	1451	352	7.7	12.60	11.61	94	500	206	6.7
	1503	358	7.1	12.51	11.74	90	460	208	6.1
	1540	324	6.1	12.67	11.49	90	500	236	5.4
	1600	315	5.9	12.36	11.63	92	440	236	6.4
	1632	296	8.3	12.02	11.75	89	430	210	7
	1659	296	6.7	11.41	11.56	90	340	240	8.5
	1730	291	9.2	11.09	11.23	91	300	232	9.2
	1753	288	7.7	11.21	11.12	91	330	227	9.2
	1826	300	8.9	11.13	10.69	93	340	255	5
	1903	319	7.0	11.09	10.47	94	340	234	5.3
	1941	332	6.0	12.08	10.42	95	360	221	3.9
	2040	347	8.9	12.93	10.44	95	380	283	2.1
	2130	004	11.6	12.63	10.28	96	360	170	2.7
	2200	020	11.2	12.46	10.21	97	355	232	5
	2241	026	12.0	12.22	9.92	97	380	229	5.5
	2311	024	12.5	12.37	10.00	97	390	223	5.6
	2341	021	12.7	12.98	10.26	97	400	216	5.4
8/ 2	0036	006	14.3	13.27	10.55	95	400	177	5.9
	0106	007	14.6	13.39	10.61	96	400	181	6.3
	0136			13.19	10.60	96	400		
	0206	005	7.1	12.99	10.52	97	400	197	6.1
	0236	358	5.3	13.09	10.38	97	400	192	4.8
	0306	359	6.1	13.16	10.25	97	400	194	5.6
	0348	329	4.6	13.15	10.26	97	400	215	5.6
	0437	297	3.7	13.35	10.18	97	400	187	8.0
	0507	289	2.7	13.13	10.33	97	410	193	8.5
	0537	238	3.0	12.83	10.52	96	420	189	10.9
	0607	195	4.2	12.78	10.56	96	420	210	8
	0630	252	4.2	12.67	10.39	96	420	197	11.1
	0705	277	5.5	13.17	10.45	96	430	209	10.0
	0758	331	7.7	14.18	10.66	96	435	197	6.9
	0835	342	16.0	13.36	10.75	96	440	173	8.7
	0905	348	18.2	12.61	10.41	97	450	186	10.5
	0935	351	12.0	11.71	9.99	97	460	193	12.0
	1005	347	17.9	10.98	9.88	92	470	184	10.3
	1028	357	17.3	11.44	10.01	95		202	9.3
	1052	001	17.7	11.37	9.92	94		207	9.2
	1130	008	14.8	12.73	10.25	93		224	6.5
	1203	359	13.0	13.07	10.51	93		232	3
	1310	352	7.9	12.93	11.20	92	480	281	6.9
	1340	11	8.5	13.12	11.27	91	480	302	7.5
	1430	357	8.3	13.07	11.42	91	480	286	7.3
	1607	358	9.9	13.03	11.57	89	480	288	8.9

Date	Time	Relative Wind Dir	Relative Wind Speed (knts)	T_s(°C)	T_4(°C)	Humid (%)	Z_i (m)	True Wind Dir	True Wind Speed (knts)
8/ 2	1701	319	12.6	13.13	11.62	90	460	281	8.3
(cont)	1721	318	12.9	13.23	11.48	90	440	282	8.8
	1755	316	14.4	13.18	11.19	91	440	286	10.2
	1837	317	15.5	12.85	10.41	93	360	315	10
	1907	328	15.6	12.78	10.00	94	400	292	9.2
	1937	339	14.2	12.15	9.95	95	400	304	6.7
	2000	334	12.8	11.61	9.91	95	400	325	4
	2030	344	11.0	11.88	9.79	95	400	293	3.4
	2101	327	9.2	12.13	9.80	96	400	279	5.1
	2137	355	7.1	12.82	9.48	97	360	295	6.6
	2156	005	6.8	12.82	9.37	97	480	305	4
	2243	009	6.0	12.19	9.24	97	360	308	3.2
	2313	009	5.4	11.75	9.32	97	360	312	3.7
	2343	022	5.6	11.70	9.48	97	380	296	4.3
	2400	035	5.5	11.80	9.53	97	390	270	4
8/ 3	0059	054	6.5	12.86	9.63	97	410	291	7.0
	0130	045	6.2	12.55	9.57	97	420	293	6.0
	0200	039	5.2	12.10	9.75	97	440	340	5
	0300	011	4.9	12.69	9.93	97	440	305	3.8
	0326	005	5.8	12.63	9.99	97	460	309	2.8
	0402	006	4.0	12.48	10.00	97	420	278	4.0
	0429	326	7.9	12.70	9.91	97	420	248	4.9
	0459	337	8.2	12.14	9.88	97	450	248	3.3
	0530	333	6.8	11.55	9.72	97	460	226	3.9
	0600	339	6.7	11.28	9.76	97	460	210	4
	0630	350	6.9	11.07	9.88	98	460	210	2.1
	0700	349	5.9	11.14	9.92	98	450	198	2.9
	0729	345	5.8	11.14	9.96	97	460	202	3.3
	0758	349	6.1	11.53	9.93	97	460	120	4
	0830	017	6.0	12.44	9.89	96	460	142	3.2
	0912	004	7.9	12.87	10.00	95	460	117	6.4
	1000	342	13.6	12.72	10.42	95		150	5.0
	1030	359	12.4	12.27	10.50	91	420	153	3.9
	1050	004	13.6	12.07	10.58	94	420	165	5.1
	1125	005	14.1	12.44	10.76	95	400	168	5.7
	1155	006	15.4	12.83	10.91	95	400	165	8
	1230	357	15.5	13.30	10.96	95	380	149	7.0
	1300	354	14.1	12.33	10.99	95	340	140	5.8
	1330	009	13.1	12.58	11.30	93	350	180	4.9
	1355	022	10.0	13.36	11.46	93	330	250	4
	1449	338	7.3	13.09	11.62	91	340	234	6.4
	1521	348	7.1	12.50	11.62	91	350	237	5.7
	1600							283	4
	1632	327	7.5	13.66	11.60	91	340	295	4.6
	1800							225	8
	1830	287	9.0	13.08	11.48	92	280	294	10.4
	1900	296	7.3	13.20	11.29	92	380	299	8.5
	2045	349	26.6	14.54	11.34	93	240	230	20.2

Date	Time	Relative Wind Dir	Relative Wind Speed (knts)	T_s (°C)	T_4 (°C)	Humid (%)	Z_i (m)	True Wind Dir	True Wind Speed (knts)
8/ 3	2106	002	20.5	14.01	11.21	93	290	248	14.0
(cont)	2157			13.30	11.24	93	260	223	4
	2227	269	3.8	12.86	11.19	93	220	274	4.0
	2257	256	2.8	12.87	11.32	94	250	256	2.8
	2327	265	7.2	12.79	11.42	94	330	270	7.2
	2357	264	8.7	12.77	11.19	95	390	310	7
8/ 4	0027	254	7.5	12.84	10.70	97	320	254	7.5
	0057	269	7.7	13.17	10.67	97	160	269	7.7
	0127	258	6.4	13.15	10.85	97	180	258	6.4
	0157	257	5.0	13.13	10.83	97	150	278	5
	0227	259	6.3	13.13	10.97	96	200	259	6.3
	0257	260	7.1	13.11	10.98	96	240	260	7.1
	0327	266	5.7	13.07	10.82	96	200	266	5.7
	0357	247	4.6	13.06	10.78	96	240	247	4.6
	0427	266	6.5	13.05	10.74	97	200	266	6.5
	0457	230	4.8	13.17	10.82	97	100	293	6
	0527	227	4.0	13.25	10.65	97	200	227	4.0
	0557	256	2.7	13.31	10.74	96	200	270	3
	0627	221	3.4	13.30	10.69	97	220	221	3.4
	0657	194	3.5	13.27	10.64	97	300	184	3.5
	0738	120	4.1	13.18	10.66	96	~310	175	4.1
	0759	180	2.4	13.15	10.75	95	400	245	3
	0859	345	11.7	13.17	10.64	97	140	215	6
	0929	345	10.2	12.43	10.12	97	160	159	2.5
	0959	019	10.0	11.69	9.80	97	220	210	3
	1037	037	10.7	11.42	10.12	96	360	300	6.5
	1107	033	9.4	11.73	10.12	97	380	293	5.2
	1151	046	10.7	12.08	10.69	96	430	310	9
	1230	055	13.2	12.98	11.13	96	340	300	10.9
	1255	061	9.5	12.49	11.39	95	380	320	9.1
	1331	344	12.2	12.42	11.66	94	320	328	11.3
	1359	062	13.6	12.62	11.72	93	350	310	12
	1429	063	14.1	12.79	11.96	93	330	314	12.8
	1500	073	15.1	13.64	12.14	93	300	330	18
	1601	354	20.2	14.04	12.05	92	340	324	19.2
	16 31	328	19.7	14.08	12.04	94	320	328	18.7
	1701	326	19.3	13.91	12.05	94	330	326	18.3
	1900							330	12
	2000	343	18.5	13.96	12.12	93	310	340	16
	2026	339	18.3	13.84	12.58	90	260	313	17.4
	2048			13.30	12.62	90			
	2400							320	10
8/ 5	0200							330	14
	0242	348	15.8	14.27	13.12	88	280	323	15.8
	0312	343	18.5	14.27	13.11	89	345	316	16.6
	0342	350	19.6	14.26	13.05	89	370	321	17.6
	0400	354	20.4	14.22	12.94	89		335	16
	0435	359	18.2	14.18	12.85	90	255	332	18.2
	0505	358	19.8	14.14	12.61	91	280	331	17.8
	0535	349	19.7	14.18	12.18	94	280	321	17.7
	0629	003	20.8	14.13	12.01	97		328	19.8

Date	Time	Relative Wind Dir	Relative Wind Speed (knts)	T_s (°C)	T_4 (°C)	Humid (%)	Z_i (m)	True Wind Dir	True Wind Speed (knts)
8/ 5	0701	013	21.4	14.13	11.63	97	310	323	20.4
(cont)	0731	003	20.2	13.93	11.63	98	330	313	19.2
	0801	014	20.2	13.79	11.46	98	340	340	17
	0929	002	17.0	14.20	11.60	98	310	352	16.0
	1001	341	17.6	14.22	11.59	98	290	345	14
	1039	331	16.4	14.19	11.64	97	300	340	15.5
	1106	326	12.8	14.19	11.64	97	310	333	12.0
	1129	317	11.4	14.21	11.74	96	320	329	10.7
	1155	260	7.7	14.20	11.94	94	260	324	12.0
	1215	241	7.2	14.16	12.00	94	260	313	13.1
	1225							315	11
	1235	248	8.0	14.17	12.03	94	260	319	13.3
	1300	257	6.2	14.04	12.12	93	250	312	11.2
	1331	259	7.8	14.30	12.10	93	250	319	12.2
	1400	272	7.5	14.26	12.05	93	190	340	8
	1430	276	8.2	14.04	11.99	94	180	329	10.8
	1500	306	6.3	13.47	11.84	94	220	337	6.7
	1521			13.54	11.92	95			
	1535							300	5
	1630	354	8.2	13.21	11.79	95	210	277	6.2
	1630							275	5
	1700	348	6.5	13.26	11.80	95	230	267	4.5
	1800							260	4
	1830	349	6.1	13.40	11.60	96	220	266	4.7
	1900	345	5.6	13.34	11.54	97	230	260	4.2
	1928	346	6.5	13.33	11.44	97	180	262	5.1
	1956	355	7.7	12.99	11.41	98	190	250	6
	2030	039	6.7	13.03	11.44	97	210	329	5.7
	2057	066	8.2	12.96	11.52	96	190	356	7.7
	2127	036	5.7	12.78	11.52	96	160	327	4.6
	2159	024	5.6	12.78	11.47	97	140	337	4
	2229	001	4.2	12.73	11.56	96	160	281	2.7
	2259	355	4.1	12.87	11.88	96	165	273	2.6
	2327	329	4.4	13.04	12.39	90	200W	235	3.2
	2355	321	5.4	13.48	12.68	88	260	270	8
8/ 6	0035	007	15.3	13.83	12.95	87	230	275	6.9
	0105	13	14.2	14.09	13.13	86	245	285	7.6
	0135	16	14.7	14.00	13.26	86	210	294	8.2
	0203	024	13.1	14.19	13.24	86	190	300	8
	0237	027	10.4	14.22	13.20	86	200	329	5.2
	0307	038	10.8	14.31	13.21	86	200	342	6.8
	0337	029	10.2	14.34	13.23	86	200	334	5.3
	0400							305	10
	0434	346	11.2	14.18	13.21	86	180	294	9.8
	0504	340	11.6	14.27	13.20	86	170	312	10.2
	0534	353	11.9	14.32	13.19	86	190	327	10.4
	0604	354	8.9	14.34	13.19	86	190	340	7
	0632	028	13.8	14.32	13.17	86	190	317	7.7
	0652	024	14.8	14.28	13.17	86	190	308	8.2
	0712	031	16.6	14.26	13.21	85	195	314	10.6

Date	Time	Relative Wind Dir	Relative Wind Speed (knts)	T_s (°C)	T_4 (°C)	Humid (%)	Z_i (m)	True Wind Dir	True Wind Speed (knts)
8/ 6	0732	034	15.0	14.27	13.25	85	190	323	9.5
(cont)	0752	045	14.7	14.28	13.30	85	190	350	7
	0830	044	10.7	14.26	13.40	85	200	348	7.4
	0859	036	10.5	13.97	13.36	86	190	330	6.1
	0936	348	11.1	13.50	13.14	88	180	315	9.1
	1006	345	8.9	13.37	13.15	89	210	310	7.0
	1015							322	5
	1056	355	8.2	13.65	13.22	89	295	334	6.2
	1126	353	6.0	13.70	13.22	89	300	330	4.0
	1156	336	5.4	14.06	13.31	89	300	325	4
	1236	010	3.4	14.27	13.52	88	310	293	4.7
	1306	280	4.5	14.79	13.65	88	220		
	1353	341	8.6	14.89	13.80	87	190	288	7.2
	1400							315	8
	1429	341	9.0	14.90	13.87	86	300	288	7.6
	1454	345	7.3	14.93	13.83	87	300	286	5.9
	1529	339	5.7	14.96	13.92	87	310	276	4.3
	1559	342	7.5	14.99	13.92	87	310	300	8
	1631	356	9.1	14.98	13.90	88	300	300	7.6
	1658	349	8.6	14.89	13.89	88	300	291	7.2
	1728	353	8.7	14.77	13.83	89	280	296	7.2
	1756	357	8.7	14.72	13.80	89	300	305	6
	1824	018	9.6	14.49	13.71	90	280	291	8.2
	1932	285	4.8	15.03	13.99	88	120	319	8.2
	2002	310	6.1	15.08	14.11	88	260	000	4
	2032	316	6.3	15.05	14.26	88	260	336	5.6
	2102	320	6.6	14.54	14.25	89	250	340	5.2
	2132	325	6.3	15.18	14.44	89	260	331	4.6
	2157	331	6.2	15.49	14.63	89	260	329	3.9
	2228	347	6.3	15.52	14.63	89	220	308	4.9
	2300	351	4.5	15.38	14.55	90	260	298	3.5
	2330	350	4.7	15.53	14.42	90	240	297	3.8
	2400							300	3
8/ 7	0000	345	6.2	15.35	14.33	89	260	292	5.2
	0030	349	4.8	15.36	14.36	89	240	315	3.4
	0052	340	3.5	15.41	14.46	90	260	314	4.9
	0114	303	4.4	15.12	14.62	91		313	6.7
	0136	295	4.3	15.26	14.53	91	260	312	7.3
	0158	331	6.1	15.28	14.62	90	280	320	4
	0230	341	5.4	15.22	14.64	92	~300	311	3.4
	0300	337	7.9	15.03	14.39	94	360	356	3.2
	0329	352	6.5	13.87	14.25	96	240	310	1.8
	0358	357	8.4	13.68	13.87	97	240	100	4
	0500	355	3.4	13.26	12.52	99	280	106	1.9
	0515	018	3.1	13.24	12.24	99		148	1.8
	0558	355	5.1	13.37	12.57	99	360	165	4
	0628	007	5.0	13.51	13.15	100	310	175	3.5

Date	Time	Relative Wind Dir	Relative Wind Speed (knts)	T_s (°C)	T_4 (°C)	Humid (%)	Z_i (m)	True Wind Dir	True Wind Speed (knts)
8/ 7	0658	013	5.7	13.44	13.39	99	340	183	4.3
(cont)	0759	015	3.8	14.16	13.97	97	290	147	4
	0855	027	4.2	13.83	14.23	97	300	200	3.3
	0954	348	9.9	14.34	14.40	93		278	2.4
	1000							325	6
	1026	343	12.7	14.26	14.32	92		292	5.2
	1129	357	8.0	14.77	14.24	92	210	316	6.5
	1159	357	8.1	14.66	14.17	91	260	325	6
	1221	011	10.3	14.68	14.14	91			
	1241	014	10.9	15.05	14.13	90		306	4.4
	1301	014	9.5	15.10	14.13	90		316	3.2
	1321	014	10.0	15.52	14.19	90	230	311	3.6
	1342	018	13.1	15.55	14.23	92		306	6.8
	1408							300	12
	1422			15.67	13.04	90	210		
	1442	029	16.3	15.23	13.00	96	220	307	10.7
	1502	019	15.0	15.09	13.07	93	230	294	8.7
	1601	306	9.1	14.81	13.22	95	220	310	7
	1629	337	12.0	14.86	13.19	95	220	319	10.7
	1701	342	12.1	14.98	13.15	96	200	309	10.7
	1731	339	13.1	14.99	13.15	96	235	307	11.7
	1801	342	13.1	14.99	13.03	96	230	310	9
	1830	024	18.5	14.93	13.06	97	240	291	13.3
	1852	022	19.6	14.96	13.10	97	240	291	14.7
	1914	027	18.0	15.18	13.16	97	260	302	12.2
	1958	035	16.4	14.36	13.06	98	290	325	12
	2030	039	17.6	14.74	13.19	99	260	319	13.0
	2055	044	17.3	14.86	13.22	99	260	325	13.1
	2120	036	17.8	14.85	13.23	99	280	315	12.9
	2141	014	15.3	13.98	13.22	99	290	318	13.8
	2200	009	15.0	13.70	13.27	99	280	325	11
	2230	347	17.5	13.70	13.21	100	260	315	15.6
	2300	347	17.6	13.53	13.23	100	240	316	15.7
	2329	343	16.8	13.71	13.25	100	240	311	14.9
	2358	351	16.4	13.65	13.11	100	240	312	13
8/ 8	0057	168	7.7	14.11	13.11	100	220	324	14.6
	0158	355	23.0	14.61	13.33	100	250	320	17
	0228	352	21.8	14.58	13.34	100	240	306	20.3
	0253	356	22.5	14.59	13.29	100	220	311	21.0
	0318	358	21.3	14.65	13.33	100	240	313	19.8
	0400	360	21.0	14.47	13.32	100	210	326	15
	0430	354	19.3	14.37	13.28	100	240	308	17.8
	0459	355	20.1	14.21	13.22	100	240	310	18.7
	0530	355	20.2	13.86	13.22	100	220	310	18.7
	0600	355	21.2	13.64	13.19	100	220	313	17
	0630	239	12.0	13.74	13.25	99	260	308	17.9
	0700	248	14.0	14.62	13.48	99	280	316	18.9
	0729	253	14.0	14.55	13.55	98	320	320	18.3

Date	Time	Relative Wind Dir	Relative Wind Speed (knts)	T_s (°C)	T_4 (°C)	Humid (%)	Z_i (m)	True Wind Dir	True Wind Speed (knts)
8/ 8	0758	254	12.9	14.27	13.58	94	300	330	10
(cont)	0830	245	13.8	14.57	13.69	96	300	314	19.0
	0849	248	13.8	14.64	13.73	93	320	316	18.8
	0901	257	15.0	14.71	13.73	95	320	324	18.8
	0933	255	14.7	14.73	13.60	96	340	322	18.8
	1003	356	19.6	14.55	13.42	96	340	330	15
	1033	352	20.0	14.54	13.44	94	320	326	18.5
	1103	357	20.2	14.52	13.39	96	330	332	18.7
	1133	360	18.8	14.51	13.37	95	380	325	17.3
	1203	000	16.4	14.52	13.36	95	340	330	13
	1231	360	17.3	14.54	13.36	95	380	330	15.8
	1310	273	9.4	14.46	13.52	95	340	330	12.3
	1330	277	9.7	14.54	13.54	95	340	333	12.0
	1350	273	8.7	14.97	13.64	94	300	327	11.8
	1410	278	8.3	15.10	13.60	94	300	328	11.0
	1430	262	8.6	14.91	13.68	92		330	11
	1533	264	5.8	13.90	13.54	94		312	10.8
	1600	287	5.6	13.34	13.34	94		330	9
	1630	003	10.5	13.37	13.15	94	300	319	9.0
	1639	346	12.3	13.07	13.20	94	300	299	10.8
	1734	343	11.9	12.96	13.26	95	310	296	10.4
	1801	341	13.5	13.12	13.32	95	310	315	11
	1830	348	13.2	13.37	13.35	96	300	327	11.7
	1859	357	14.9	13.42	13.35	96	230	336	13.4
	1930	356	15.3	13.57	13.44	93	190	316	13.8
	2000	359	14.9	13.68	13.50	96	320	320	11
	2130	355	15.1	13.82	13.24	97		314	13.1
	2200	355	15.6	13.00	13.23	97	240	314	13.6
	2230	346	14.8	13.15	13.20	97	280	304	12.9
	2300	351	14.8	13.20	13.17	98	310	310	12.8
	2330	356	12.6	13.23	13.10	98	300	315	10.6
8/ 9	0000	003	13.0	13.34	13.08	98	290	315	9
	0035	025	19.0	13.68	13.10	98	320	311	12.2
	0105	028	19.0	13.81	13.26	98	310	316	12.5
	0135	029	20.3	14.16	13.42	97	360	316	13.9
	0205	033	18.4	14.82	13.69	96	360	315	12
	0235	022	16.9	14.68	13.99	95	340	310	10.0
	0305	024	17.0	14.47	14.27	94	360	313	10.3
	0330	047	13.7	14.64	14.50	93	370	341	10.2
	0403	359	12.6	14.69	14.51	91	380	330	7
	0429	359	9.6	14.72	14.43	92	400	318	8.1
	0505	350	12.1	14.75	14.34	91	310	324	10.7
	0535	347	11.5	14.76	14.23	91	320	321	10.1
	0605	354	11.9	14.74	14.01	92	340	325	11
	0630	029	17.7	14.72	13.74	92	320	332	12.8
	0730	039	21.0	14.64	13.32	94	260	312	16.8
	0758	043	20.0	14.69	13.34	94	270	325	13
	0830	040	20.9	14.65	13.38	94	300	313	16.7

Date	Time	Relative Wind Dir	Relative Wind Speed (knts)	T_s (°C)	T_4 (°C)	Humid (%)	Z_i (m)	True Wind Dir	True Wind Speed (knts)
8/ 9	0859	041	19.7	14.56	13.38	95	300	316	15.7
(cont)	0929	042	21.4	14.74	13.41	95	300	316	17.4
	1000	355	18.9	14.60	13.28	96	300	320	17.9
	1019	352	18.8	14.62	13.35	95	310	317	17.8
	1038	354	18.1	14.65	13.32	96	330	319	17.1
	1100	355	17.8	14.65	13.36	96	345	320	13
	1142	341	16.5	14.62	13.35	92	350	305	15.6
	1202	349	17.2	14.63	13.35	92	320	310	14
	1225	346	19.4	14.65	13.35	95	340	317	17.9
	1330	256	13.7	14.80	13.56	92	340	323	17.7
	1358	261	12.5	14.67	13.55	92	340	340	12
	1500	263	13.6	14.89	13.46	91	340	328	16.9
	1530	273	12.1	14.96	13.40	93	360	345	14.4
	1554	259	9.8	14.79	13.25	93	340	345	11
	1700	347	13.8	14.67	13.05	94	340	330	12.3
	1730	343	13.5	14.66	12.98	95	340	325	12.1
	1800	348	12.8	14.66	12.93	95	360	335	11
	1830	353	13.0	14.66	12.86	95	340	334	11.5
	1858	354	13.3	14.67	12.73	96	340	335	11.9
	1930	141	3.8	14.68	12.73	97	335	338	11.2
	1950	200	3.0	14.63	12.96	97	320	355	10.9
	2010	201	4.1	14.60	12.74	97	340	330	6
	2030	197	3.0	14.61	13.06	96	350	354	10.9
	2101	346	12.2	14.64	12.77	97	360	329	10.8
	2131	346	11.3	14.58	12.77	93	345	330	9.8
	2201	349	11.0	14.62	12.74		320	325	9
	2229	343	12.2	14.66	12.69		330	325	10.8
	2259	349	13.3	14.66	12.49	95	340	332	11.8
	2332	347	13.3	14.68	12.46	96	340	315	11.9
8/10	0002	350	14.2	14.71	12.38	96	320	320	11
	0050	278	10.3	14.49	12.29	96		342	12.2
	0125	285	8.6	14.66	12.14	97	340	340	10.1
	0200	278	7.5	14.15	12.13	97	340	330	7
	0358	325	6.5	13.98	11.89	98	400	350	5
	0441	351	6.1	13.97	11.68	98	320	317	4.1
	0501	351	6.1	13.95	11.59	98	340	316	4.2
	0521	355	6.7	13.84	11.53	98	350	323	4.7
	0553	004	6.1	13.60	11.36	98	340	345	4
	0730	027	13.9	13.75	11.80	98	390	318	7.4
	0800	034	15.3	13.68	11.79	98	400	310	12
	0830	040	16.0	14.09	11.87	98	400	330	10.9
	0900	043	16.8	14.74	11.90	98	410	332	12.1
	1000	356	15.3	14.41	12.05	97	430	320	13
	1028	351	8.4	14.50	12.10	93	460	325	13.0
	1100	357	12	14.53	12.17	95	475	331	11.0
	1200							320	8
	1230	003	9	14.52	12.38	89	460	328	8.0
	1300	028	13	14.57	12.59	92	450	318	8.2
	1320	031	13	14.75	12.64	92	420	322	8.4

Date	Time	Relative Wind Dir	Relative Wind Speed (knts)	T_s (°C)	T_4 (°C)	Humid (%)	Z_i (m)	True Wind Dir	True Wind Speed (knts)
8/10	1340	034	14	14.90	12.72	90	440	324	9.6
(cont)	1400	033	14	14.89	12.78	90	460	315	9
	1426	034	15	14.73	12.88	91	460	323	10.6
	1446	037	15	14.78	12.94	89	440	326	10.8
	1506	041	15.5	14.83	13.11	83	400	331	11.7
	1526	042	16	14.50	13.24	88	390	331	12.2
	1558	002	15	14.39	13.32	88	340	325	11
	1634	358	14	14.69	13.40	81	300	313	12.5
	1704	355	14	14.74	13.47	88	260	309	12.5
	1734	345	15	14.71	13.62	89	240	298	14.5
	1804	352	17	14.71	13.79	89	~300	330	14
	2000							330	11
	2030	359	17	14.27	14.17	88	~290	329	15.5
	2102	001	17.5	14.07	14.22	88	280	331	16.0
	2132	002	18	14.11	14.22	90	200	332	16.5
	2158	003	18	14.54	14.23	92	260	345	14
	2230	002	18	14.60	13.86	97	300	342	16.5
	2300	338	18	14.60	13.80	97	280	316	16.6
	2330	347	19	14.60	13.80	98	~200	326	17.5
	2358	342		14.57	13.89		180	335	14
8/11	0031	258	14	14.60	14.06	97	110	330	17.8
	0058	258	15	14.68	14.23	97	140	332	18.7
	0130	261	14	14.68	14.30	96	200	324	17.5
	0200	272	11	14.76	14.43	96	270	325	11.0
	0230	266	11	14.82	14.72	94	140	322	14.3
	0256	282	8	14.62	14.63	94	0	321	10.4
	0400	347	16	14.70	14.64	93	260	315	12
	0430	347	16	14.51	14.75	91	200	320	14.5
	0500	353	16	14.38	14.70	91	240	327	14.5
	0530	354	14	14.48	14.63	91	250	328	12.5
	0600	000	14	14.45	14.59	91	260	325	11
	0800							335	17
	1000							320	16
	1030	346	14.8	14.63	15.26	90		309	13.3
	1200							330	12
	1400							330	11
	1558	349	14.6	14.62	15.20	90	280	325	11
	1640	004	16.5	14.59	15.05	86	240	319	15.5
	1726	356	16.9	14.56	15.03	91	280	311	15.9
	1756	354	18.1	14.58	14.67	92	260	325	12
	1857	356	17.7	14.59	14.00	93	230	311	16.7
	1930	344	16.4	14.59	14.11	94	~300	298	15.4
	2000	349	16.9	14.55	14.33	94	260	325	14
	2030	160	10.6	14.58	14.25	94	300	328	15.4
	2130	350	14.4	14.35	14.71	94	190	304	13.0
	2200	352	15.9	14.37	14.68	94	0	320	14
	2229	357	16.2	14.47	14.78	94	200	312	14.7
	2258	002	18.2	14.64	14.73	94	300	317	16.7

Date	Time	Relative Wind Dir	Relative Wind Speed (knts)	T_s(°C)	T_4(°C)	Humid (%)	Z_i (m)	True Wind Dir	True Wind Speed (knts)
8/12	0000	351	16.8	14.69	14.66	94	200	330	12
	0026	187	7.8	14.68	14.47	94	140	324	12.8
	0046	204	5.1	14.45	14.33	96	100	332	9.9
	0106	258	4.3	14.33	14.34	96	0	355	7.2
	0130	343	8.0	14.49	14.40	96	0	299	6.6
	0145	334	8.7	14.50	14.54	95	0	289	7.4
	0200	337	10.1	14.52	14.63	94	0	315	8
	0235	350	12.3	14.52	14.71	93	0	308	10.8
	0305	354	15.0	14.43	14.59	94	200	309	13.5
	0335	354	16.3	14.29	14.19	96	180	308	14.8
	0359	342	14.1	14.29	14.08	96	190	330	12
	0433	344	11.4	14.44	14.10	97	270	316	10.0
	0503	336	10.6	14.58	14.54	95	200	307	9.2
	0533	332	8.8	14.58	14.78	94	210	301	7.5
	0558	341	8.5	14.47	14.56	93	0	280	6
	0632	010	2.2	14.43	14.57	95	0	281	5.8
	0659	017	4.6	14.70	14.55	95	0	264	3.8
	0724	006	5.2	14.92	14.67	95	120	274	2.9
	0749	338	3.2	14.84	14.84	94	100	298	5.2
	0834	351	4.2	14.69	14.83	93	100	295	3.9
	0854	349	2.5	14.13	14.94	92		289	5.6
	0930	314	2.7	13.93	14.78	94	260W	291	6.9
	1047	346	10.4	14.13	14.61	91	140W	284	9.0
	1128	342	9.6	14.43	14.77	94	160W	279	8.2
	1158	342	9.8	14.72	14.97	93	160W	270	6
	1243	348	9.7	14.94	15.36	91	0	276	8.3
	1400	301	2.9	15.09	15.58	90	0		Calm
	1500	286	3.1	15.46	15.46	92	0	296	8.2
	1530	304	3.2	14.91	15.55	92	0	296	7.2
	1600	346	5.1	15.42	15.40	93	200	155	2
	1630	013	7.3	14.99	15.02	93		225	2.2
	1645								Calm
	1705	193	3.0	14.79	15.59	90	180	203	3.0
	1750	073	5.7	14.88	15.51	91	0	354	5.6
	1800							300	5
	1830	001	9.4	14.98	15.35	92	0	297	8.4
	1900	360	9.7	15.27	15.06	93	140W	295	8.7
	1930	001	11.0	14.39	14.98	94	0	297	10.0
	1954	007	11.1	14.42	14.99	94	0	305	7.
	2030	355	10.3	14.03	14.85	95	0	304	9.3
	2100	354	10.3	14.36	14.76	95	240	303	9.3
	2136	165	5.5	14.14	14.88	94	240	298	13.4
	2156	175	8.8	13.74	14.47	95	300	320	11
	2234	000	16.6	13.45	14.50	95	200	325	15.1
	2304	357	16.8	13.71	13.88	97	140	317	15.3
	2334	354	12.6	14.09	13.58	97	120	314	11.1

Date	Time	Relative Wind Dir	Relative Wind Speed (knts)	T_s(°C)	T_4(°C)	Humid (%)	Z_i (m)	True Wind Dir	True Wind Speed (knts)
8/13	0004	007	13.0	14.12	13.56	95	0	335	8
	0048	008	18.1	13.88	14.13	94		285	10.3
	0125	015	21.3	14.12	14.31	93		294	13.7
	0155	17	21.8	14.23	14.44	92		305	12
	0241	21	21.6	14.05	14.61	91		303	14.4
	0301	26	22.4	14.15	14.67	90		310	15.6
	0324	31	22.6	14.11	14.68	90	~300	315	16.3
	0358	355	17.9	13.80	14.74	91	280	315	15
	0429	359	22.3	13.96	14.77	90	200	329	20.8
	0456	353	19.4	13.79	14.73	90	280	322	17.9
	0530	348	18.6	13.65	14.79	90	300	317	17.1
	0553	347	17.5	13.58	14.78	90	380	316	16.1
	0600							310	12
	0700	30	21.8	14.08	14.91	90	~310W	307	15.0
	0730	30	21.8	14.38	15.06	89	360	308	15.1
	0800	36	22.2	14.99	15.17	89		310	14
	0830	35	21.7	15.04	15.14	89		314	15.5
	0900	37	22.7	15.04	15.10	89		315	16.7
	1000	355	22.6	14.96	15.17	88		310	21.6
	1030	352	22.5	15.05	15.16	89		307	21.5
	1100	355	21.5	15.11	15.19	89		310	20.6
	1130	353	20.9	15.20	15.23			307	19.9
	1200	351	21.6	15.25	15.27	87		315	16
	1300	177	12.4	15.16	15.38	87		303	20.4
	1330	349	23.0	15.01	15.35	86		313	21.5
	1500	349	21.3	15.07	15.40	89	240W	303	19.8
	1530	348	21.9	15.04	15.39	89	200W	303	20.5
	1600	351	21.9	15.05	15.43	88	200W	320	18
	1632	356	21.6	15.06	15.45	88		311	20.1
	1702	352	20.6	15.15	15.45	89	260W	306	19.1
	1723	355	22.4	15.22	15.53	88	260W	310	20.9
	1758	354	23.3	15.27	15.54	88	240W	320	19
	1909	242	17.8	15.14	15.45	89	210	313	23.1
	1929	240	17.8	15.03	15.35	90	200	311	23.4
	1949	245	20.1	15.22	15.36	90	200	316	24.9
	2000							325	20
	2035	242	21.0	14.68	15.38	88	190	311	26.1
	2100	241	22.0	14.13	15.22	89	200	310	27.2
	2125	241	21.6	14.21	15.10	89	225	310	26.7
	2158	242	20.4	13.99	15.01	90	240	310	20
	2252	355	24.2	15.00	14.98	88	360	310	23.2
	2325	351	23.1	14.81	14.93	88	380	306	22.1
	2355	356	22.6	13.93	14.84	88	380	310	21
8/14	0030	234	13.8	14.64	14.64	89	340	315	19.6
	0059	250	14.1	15.04	14.53	89		325	18.5
	0128	254	14.6	15.51	14.38	87	380	329	18.5
	0157	264	12.2	15.62	14.17	88	380	345	11
	0230	265	10.7	15.54	13.87	89	300	330	13.9

Date	Time	Relative Wind Dir	Relative Wind Speed (knts)	T_s (°C)	T_4 (°C)	Humid (%)	Z_i (m)	True Wind Dir	True Wind Speed (knts)
8/14	0258	305	12.4	15.59	13.58	89	380	357	10.3
(cont)	0358	004	6.8	14.95	12.20	96	320	340	6
	0430	354	5.7	14.87	12.26	95	320	300	4.7
	0459	002	4.9	14.85	12.10	97	340	310	3.9
	0528	009	3.9	14.80	11.95	98	290	319	2.9
	0554	026	3.2	14.28	11.78	98	240	115	5
	0634	016	7.2	14.56	11.75	99	240	328	2.2
	0653	331	4.6	15.10	11.77	99	240	039	4.6
	0735	261	4.0	15.49	11.82	98	240	076	4.0
	0805	285	3.8	15.49	11.68	99	210	135	3
	0835	341	3.5	15.48	11.74	99	220	143	4.8
	0853	311	3.0	15.47	11.77	99	240	150	6.4
	0930	002	8.8	15.49	12.05	99	260	137	7.3
	1000	012	6.8	15.51	12.21	98	260	165	5
	1028	002	6.1	15.56	12.38	95	200	148	4.5
	1100	017	5.5	15.65	12.33	97	220	169	4.0
	1130	007	4.6	15.78	12.46	96	160	161	3.1
	1200	008	5.0	16.01	12.38	96	190	195	4
	1229	353	4.7	16.03	12.36	96	190	170	3.2
	1306	339	9.6	16.44	12.72	88	160	210	3.6
	1326	345	11.2	16.55	12.97	95	140	228	3.8
	1357	355	12.3	16.84	13.31	95	140	305	5
	1438	009	15.7	17.21	14.84	88	180	300	7.4
	1458	015	16.7	16.62	13.49	91	120	310	8.8
	1518	020	16.9	15.97	13.11	94	140	318	9.4
	1554	023	18.3	15.96	12.71	98	140	321	11.0
	1630	026	18.6	15.97	13.81	93	140	325	11.5
	1755	354	18.8	15.39	14.12	91	110	335	13
	1830	355	18.9	15.30	14.08	91	140	335	17.9
	1930	045	17.7	14.06	13.94	92	140	329	13.2
	2000	046	18.6	14.04	14.12	92	160	335	14
	2030	044	17.6	14.21	14.34	92	~190	329	13.0
	2100	046	16.1	14.48	14.55	90	130	333	11.8
	2130	040	13.0	15.27	14.76	89	260	338	8.5
	2200							335	9
	2230	352	11.1	15.02	14.67	90	300	326	10.1
	2300	344	10.4	14.94	14.62	90	~280	317	9.4
	2330	338	9.6	14.84	14.61	90	~280	311	8.7
8/15	0000	335	9.6	14.80	14.60	90	~280	312	7
	0034	317	4.2	14.86	14.63	90	~280	015	5.7
	0101	037	5.2	14.96	14.66	90	~290	305	5.0
	0132	327	7.7	15.02	14.71	89	270	284	6.5
	0155	344	7.1	15.05	14.69	89	280	290	4
	0230	347	6.6	15.13	14.66	88	300	273	5.2
	0300	348	7.6	15.19	14.61	88	270	276	6.1
	0330	350	9.2	15.19	14.55	88	300	288	7.7
	0400	001	9.4	15.14	14.53	89	220	305	7
	0428	002	9.3	15.10	14.53	89	160	297	7.8
	0500	001	12.8	15.05	14.49	88	170	311	11.3

Date	Time	Relative Wind Dir	Relative Wind Speed (knts)	T_s(°C)	T_4(°C)	Humid (%)	Z_i (m)	True Wind Dir	True Wind Speed (knts)
8/15	0530	005	13.5	15.08	14.45	89	160	320	12.0
(cont)	0600	003	12	15.14	14.45	88	200	360	9
	0633	312	11.3	15.07	14.49	87	220	011	8.5
	0700	327	9.6	14.94	14.41	88	260	001	5.3
	0725	339	7.7	14.40	14.23	89		343	2.9
	0750	356	7.2	14.40	14.23	92		302	1.0
	0800							195	4
	0830	015	6.2	14.67	14.10	94	240	231	2.6
	0902	026	5.7	15.36	14.39	91	210	229	3.8
	0932	019	4.0	15.48	14.57	91	180	252	4.4
	0957	018	5.7	15.84	14.68	89	310	190	3
	1116	357	8.6	15.91	14.68	90	340	196	7.1
	1128	351	9.1	15.93	14.76	89	330	190	7.6
	1200	356	9.4	16.05	14.68	90	335	180	8
	1230	358	9.4	16.07	14.69	90	350	198	7.9
	1258	043	9.2	15.93	14.73	89	390	186	6.4
	1330	049	9.4	15.60	14.49	89	400	189	7.3
	1400	047	9.3	15.50	14.30	90	380	170	6
	1430	046	9.0	15.66	14.19	90	385	190	6.7
	1500	042	7.8	15.62	14.05	88	400	197	5.7
	1530	042	8.8	15.84	14.23	89	390	189	6.1
	1558	013	9.4	15.78	14.27	89	360	225	7
	1630	352	9.6	15.76	14.17	89	340	167	8.6
	1732	358	9.0	15.83	14.11	89	370	172	8.1
	1827	028	8.0	15.83	14.38	89	345	239	6.7
	1900	033	7.1	15.72	14.44	89	310	245	5.9
	2003	004	3.5	15.75	14.20	90	400	180	3
	2033	309	5.4	15.65	14.08	90	440	139	4.6
	2059	307	6.6	15.72	13.83	91	440	140	5.8
	2131	027	4.7	15.71	13.70	94	390	243	3.4
	2157	000	5.6	15.64	13.63	95	~450	200	4
	2230	010	3.0	15.60	13.67	94	460	229	1.6
	2256	037	5.5	15.55	13.62	95	390	259	4.4
	2330	048	5.6	15.57	13.38	95	440	272	4.7
	2357	057	5.7	15.65	12.99	97	460	310	4
8/16	0040	017	11.4	15.44	13.11	99	480	325	4.5
	0100	023	16.0	15.40	13.35	97	480	318	9.2
	0120	018	17.0	15.16	13.44	97	480	308	9.7
	0140	024	17.9	15.32	13.59	97	480	315	11.0
	0200	025	18.9	15.37	13.90	96	500	330	12
	0230	028	19.5	15.46	14.34	94	500	320	13.0
	0259	030	20.7	15.53	14.37	94	460	321	14.3
	0318	027	20.9	15.62	14.49	92	440	316	14.2
	0352	342	14.4	15.60	14.49	92	420	311	13.4
	0400							315	10
	0430	353	14.6	15.57	14.60	92	440	312	12.6
	0458	353	13.9	15.53	14.68	91	460	312	12.0
	0525	005	14.6	15.48	14.75	87	450	326	12.6
	0556	005	15.5	15.65	14.75	85	440	320	10

Date	Time	Relative Wind Dir	Relative Wind Speed (knts)	T_s (°C)	T_4 (°C)	Humid (%)	Z_i (m)	True Wind Dir	True Wind Speed (knts)
8/16	0630	260	9.3	15.52	14.68	86	380	327	13.7
(cont)	0700	123	16.2	15.53	14.60	84	390	042	22.0
	0730	040	20.6	15.52	14.63	84	400	321	15.1
	0754	034	19.9	15.70	14.68	85	380	310	17
	0900	034	21.5	15.40	14.69	87		312	15.2
	0930	034	21.4	14.68	14.60	88		312	15.2
	1000	029	23.6	14.66	14.75	86		305	19
	1029	032	24.2	15.23	14.95	84		306	17.6
	1058	001	20.2	15.05	14.95	82		316	18.7
	1130	358	19.7	15.11	14.95	85		312	18.2
	1200	357	19.4	15.19	15.01	85		320	16
	1233	359	19.4	15.26	15.09	83	340	314	17.9
	1300	183	9.6	15.28	15.18	81	300	332	17.6
	1327	256	15.1	15.31	15.23	83	320	321	18.7
	1400	358	20.7	15.27	15.14	84	320	320	17
	1430	356	21.2	15.34	15.16	85	320	315	19.7
	1500	355	21.7	15.40	15.24	84	330	315	20.2
	1530	350	21.9	15.35	15.26	85	280	309	20.2
	1600	351	23.2	15.29	15.26	83	200	320	18
	1624	352	24.1	15.30	15.30	84	200	312	22.7
	1700	337	23.2	15.26	15.34	83	300	306	23.2
	1730	343	24.2	15.27	15.34	83	300	312	22.8
	1800	346	24.7	15.28	15.34	83	300	325	18
	1830	345	21.1	15.24	15.37	83	300	309	20.1
	1900	239	15.1	15.08	15.40	83		312	20.5
	1927	239	16.5	14.44	15.28	80		313	21.7
	1954	237	15.9	14.71	15.19	82		312	21.3
	2000							320	14
	2030	237	14.8	15.75	15.25	82		311	20.3
	2100	236	16.8	15.74	15.35	80		311	22.3
	2130	237	19.6	15.57	15.39	79		315	24.8
	2145	242	22.1	15.48	15.47	77		320	26.9
	2230	357	31.9	15.54	15.47	80		89	23.9
	2250	355	31.4	15.49	15.40	79		87	23.5
	2310	354	30.1	15.39	15.34	82		84	22.1
8/17	0000	234	19.8	15.40	15.26	82		345	20
	0058	239	16.6	15.30	15.02	79		324	19.6
	0130	241	16.9	15.09	14.81	80		326	19.8
	0200	240	17.8	14.82	14.54	82		340	17
	0230	240	14.6	14.99	14.37	84		323	17.6
	0245	245	11.5	15.13	14.32	84		324	14.4
	0330	234	12.0	15.08	14.20	84		317	15.5
	0347	244	12.5	15.01	14.07	85	420	324	15.4
	0430	352	17.1	14.78	13.94	85	~410	321	16.1
	0451	353	16.7	14.87	13.84	86		317	14.7
	0600	237	9.0	13.85	13.63	87	510	325	12
	0635	237	8.4	13.75	13.45	85	600	317	15.3
	0705	266	5.9	13.50	13.49	82	660	322	11.2
	0735	310	8.1	13.53	13.11	84	640	349	7.3
	0805	341	11.4	13.10	12.06	88	630	046	4.1
	0835	328	10.0	14.38	12.98	81	620	024	5.3

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